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Application of High-Sensitivity Troponin in Suspected Myocardial Infarction

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ABSTRACT:

BACKGROUND: Data regarding high-sensitivity troponin concentrations in patients presenting to the emergency department with symptoms suggestive of myocardial infarction may be useful in determining the probability of myocardial infarction and subsequent 30-day outcomes.

METHODS: In 15 international cohorts of patients presenting to the emergency department with symptoms suggestive of myocardial infarction, we determined the concentrations of high-sensitivity troponin I or high-sensitivity troponin T at presentation and after early or late serial sampling. The diagnostic and prognostic performance of multiple high-sensitivity troponin cutoff combinations was assessed with the use of a derivation–validation design. A risk tool that was based on these data was developed to estimate the risk of index myocardial infarction and of subsequent myocardial infarction or death at 30 days.

RESULTS: Among 22,651 patients (9604 in the derivation data set and 13,047 in the validation data set), the prevalence of myocardial infarction was 15.3%. Lower high-sensitivity troponin concentrations at presentation and smaller absolute changes during serial sampling were associated with a lower likelihood of myocardial infarction and a lower short-term risk of cardiovascular events. For example, high-sensitivity troponin I concentrations of less than 6 ng per liter and an absolute change of less than 4 ng per liter after 45 to 120 minutes (early serial sampling) resulted in a negative predictive value of 99.5% for myocardial infarction, with an associated 30-day risk of subsequent myocardial infarction or death of 0.2%; thus, 56.5% of the patients were assigned to the low-risk group. These findings were confirmed in an external validation data set.

CONCLUSION: We developed a risk tool to integrate the high-sensitivity troponin I or troponin T concentration at emergency department presentation, its dynamic change during serial sampling, and the time between the obtaining of samples to estimate the probability of myocardial infarction on emergency department presentation and 30-day outcomes.

STATEMENT: *In this present manuscript we harmonized more than 22.000 individuals with suspected myocardial infarction from 15 international cohorts and from 13 countries. Here we developed a novel risk tool to integrate high-sensitivity*

troponin concentration at emergency department presentation, its dynamic change during serial sampling, and the time between samples, to estimate the probability of myocardial infarction. These findings will have impact on the diagnosis of myocardial infarction worldwide.

BACKGROUND: This study was coordinated and analysed by the Clinic for General and Interventional Cardiology of the University Heart Center Hamburg. The first author of the manuscript, Dr. Neumann, is a Cardiologist at the Department for General and Interventional Cardiology. The last author, Professor Blankenberg, is the Head of the Department for General and Interventional Cardiology. Importantly, the study was supported and facilitated by a large number of physicians and nurses, working in the interdisciplinary setting of the UKE emergency department, by the German Center for Cardiovascular Research (DZHK) and the Institute of Clinical Chemistry and Laboratory Medicine.